In the Specification

Please replace paragraphs [0001] through [0022] with the following:

Related Application

This is a §371 of International Application No. PCT/FR2003/02477, with an international filing date of August 6, 2003 (WO 2004/015996, published February 19, 2004), which is based on French Patent Application No. 02/10002, filed August 6, 2002.

Field of the Invention

~~The present~~This invention relates to the scrambling of any multimedia program or sequence using a nominal stream format of the MPEG-4 type ~~in order~~ to realize conditional access, secure broadcasting, recording control, private copy and ~~the~~ viewing of these multimedia programs or sequences by authorized users and ~~proposes~~provides a secure system for ~~the~~ processing, access, broadcasting, delivery, recording, private copy, viewing and management of program rights and of interactive video or multimedia sequences.

Background

The general problem is to make available a device capable of transmitting in a secure manner a unit of high quality visual films in a format of the MPEG-4 type directly to a television screen and/or to be recorded on the hard disk of a box connecting the communication network to a monitor screen, television screen, video projector or movie screen while preserving the audiovisual quality yet avoiding any fraudulent use such as the possibility of making pirate copies of audiovisual films or programs recorded on the hard disk of the set-top box.

~~The invention also allows a total control over the use of copies and rights attached to the works distributed in this manner.~~

It is possible with current solutions to transmit audiovisual films and programs in digital format via broadcasting networks of the microwave, cable satellite, etc. type or via telecommunication networks of the DSL type (digital subscriber line) or BLR type (local radio loop), via DAB networks (digital audio broadcasting) or via digital telecommunication networks (GSM, GPRS, UMTS). In addition, ~~in order to avoid the pirating of works broadcasted in this manner,~~ the latter are frequently encrypted by various means well known ~~to an expert~~ in the art to avoid the pirating of works broadcasted in this manner.

~~Patent PTC~~ WO00165762 ~~known in the state of the art describes~~discloses a conditional access system in which a headend transmits content to one or several receivers in encrypted transport streams. This system offers a multi-layer security architecture that renders the system resistant to key replay attacks. ~~If one layer is distorted the~~The following layer remains intact if one layer is distorted. A first layer prevents the recording of encrypted keys while protecting these encrypted keys of the users and while encrypting the path from the conditional access module of the receiver running to the transport decryption module. A second layer prevents a recorded key from being rerun on a receiver at the level of the transport decryption module of a second receiver. A third layer prevents the user from decrypting transport streams without the encrypting module while encrypting the stream a second time before its passage into any memory or any processor accessible by a user. Event tables are transmitted with the non-encrypted transport stream for an immediate or encrypted use ~~in order~~ to prevent a non-authorized use.

The main disadvantage of ~~this~~that solution is that it is necessary to transmit not only the encrypted data to the users but also the decryption keys. The transmission of the decryption keys can take place before, at the same time as or after ~~the~~ transmission of the audiovisual programs. ~~In order to increase the security and therewith the protection of audiovisual works against an ill-disposed use,~~

~~the~~The decryption keys as well as the decryption functions of the audiovisual decoders can comprise improved security means such as smart cards or other physical keys that can optionally be updated remotely to increase the security and therewith the protection of audiovisual works against an ill-disposed use.

Thus, ~~the~~ current solutions applied to a set-top decoder box with the possibility of local recording of audiovisual programs in digital format on any support of the hard disk type or some other type of memory offer an ill-disposed user the possibility of making non-authorized copies of recorded programs ~~recorded in this manner~~ since at a given moment this user has, with ~~his~~the set-top decoder box which is associated or non-associated with smart card systems, all the information, software programs and data permitting the complete decryption of audiovisual programs. Precisely on account of the fact that ~~he~~the user has all the data, the ill-disposed user has the possibility of making illegal copies without anyone noticing this fraudulent copying at the moment at which it is made.

One solution would therefore consist of transmitting all or part of a digital audiovisual program only on demand (video services on demand) via a broadband telecommunication network of the ADSL type, cable or satellite, without authorizing the local recording of audiovisual programs. ~~Document~~ WO0011871 ~~(open entertainment) thus proposes a solution of~~discloses distributing multimedia files on the request of the user. Its disadvantage resides in the performances of these networks, which do not allow continuous streams of several megabits per second to each user to be guaranteed, as required by MPEG-4 streams that require bands succeeding several tens of kilobits to several megabits per second.

Given these conditions, one solution consists ~~in~~of separating the stream into two parts, neither of which could be used by itself. Several patents have been filed with this in mind. Thus,

~~document~~ WO9908428 ~~teaches~~discloses a multi-applicative processing method of a localizable active terminal in which at least one connection is made with an identifiable program dedicated to ~~the~~ execution of an application, which program dictates its conditions of use to the terminal for making functions available. The terminal talks sporadically by using a connection with the managing center for realizing, if necessary, inputs and outputs of the capacities of the latter, which management center becomes a slave or does not become a slave of the terminal at the level of the application software relative to the entering program. This invention also relates to the process for identifying the program and the terminal in use. This process of the prior art divides the stream into a part serving to identify the user and a part that contains the program itself. In particular, this program is not unusable but only blocked by the first part.

On the other hand, ~~document~~ EP0778513 ~~describes~~discloses a process that permits ~~the~~ illegal use of information to be prevented by adding control information ~~in order~~ to verify the rights of the user. The system permits permanent knowledge of which part of the information is used and by which user and, consequently, whether this user is illegal or not. This process thus secures the data by adding additional information to it that adulterates the initial information.

~~Another solution known in the prior art is document~~ US4916737~~, that proposes~~ discloses a system of scrambling and descrambling audiovisual streams using classic scrambling solutions but which regularly changes the descrambling keys or tables by means of a telephone connection to a server, identifying the appropriate code for each piece of addressed equipment. The importance of this process is to regularly change the descrambling keys (tables) stored in the rewritable memory of the addressed equipment in contrast to a system in which these keys are fixed. The server connects once a month to the set-top decoder box of the client, identifies it and rewrites the new tables.

~~This invention~~That system does not claim any innovative protection means but rather the protection is based on encryption keys that, although reinitialized periodically, remain the same for all the visual streams. In the case in which an ill-disposed person retrieves these keys, ~~he~~such a person would be able to visualize all the visual streams during their period of validity. Moreover, the process of this document applies to systems of broad broadcasting of televised programs in which the protected films are descrambled and visualized in real time on the client equipment and is therefore not applicable to services of video on demand since the possibility of storing the protected films on the addressed equipment is not treated.

~~Document~~ WO0049483 ~~proposes~~discloses a process for creating a connection between ~~the~~ users and an editor of digital entities. The process comprises at least one of the following ~~stages~~steps: ~~The stage of~~ subdividing this digital entity into two parts, ~~the state of~~ memorizing a part in a memory zone of a server connected to a computer network, ~~the stage of~~ transmitting the other part to at least one user with computer equipment, ~~the state of~~ connecting ~~this~~the computer equipment to ~~this~~the computer network, ~~the state of~~ establishing a functional connection between ~~this~~the first part and ~~this~~the second part. ~~These~~Those processes and systems do not specify whether the memorized part on the server can be stored by the user, which would permit ~~him~~the user to pirate this digital entity.

~~Patent~~ WO197520 ~~also presents~~discloses methods~~, processes~~ and devices for controlling ~~the~~ transmission and ~~the~~ recording of digital content of the MPEG-2 type. Nevertheless, ~~this patent~~it does not present any specific character for audiovisual documents of the MPEG-4. Moreover, the method is ~~totally~~ ineffective for low-bandwidth telecommunication networks because it substitutes all or part of the I images whose weight in bytes is very expensive during the transmission of the second stream.

Finally, ~~in this approach~~ the closest state of the art is found in the patents of HyperLOCK Technologies, and of which ~~the most~~a pertinent one is ~~document~~ US05937164. ~~This~~That invention makes use of the solution consisting of separating the stream into two parts of which the smallest one comprises information necessary for using the largest one. Nevertheless, ~~this~~that patent is not sufficient for corresponding to the identified problem. In fact, the suppression of one part of the stream adulterates the format of the stream and it can therefore not be recognized as a standard stream that can be used for general software applications. ~~This~~That process ~~of the prior art~~ requires a specific software at the same time on the server side for separating the two parts and another specific software assuring not only the reconstruction of the stream but also the acquisition of the main stream and its use according to a proprietary format for the solution. ~~This~~That proprietary format is not the initial format of the stream before separation into two parts in this known solution.

~~This company has also filed three other patents: Document~~ US 5892825 recapitulates the preceding patent, but in a less extensive framework because the streams in it are always encrypted. ~~Document~~ US6035329 is based on the same principle and relates to a process permitting the reading of a disk of the CD-ROM or DVD-ROM type conditioned on ~~the~~ identification of rights by inserting a smart card on which the information necessary for reading is stored. ~~This~~That process is still insufficient for our problem because it does not guarantee that the modified stream has the same format as the original stream. Finally, ~~document~~ US6185306 relates to a process for transmitting encrypted data from a web site to a requesting computer. However, ~~this~~that process allows the user to have all the tools necessary to copy the data at a given moment.

~~Document~~ EP0949815 ~~is also in the prior art and~~ relates to a process and a system for protecting video stream of the MPEG type, comprising decoding modules, arrangement tables and rearrangement tables and consists of inverting or permuting the order of the macroblocks or of the

slices in the images ~~in order~~ to degrade the visual quality of the resulting stream, ~~thus~~thereby creating the protection of this stream and guaranteeing that the resulting stream respects the norm of the original stream, thus allowing the protected stream to be read by every player capable of accepting the original format without it being disturbed or damaged. A first embodiment comprises the protection arrangement table stored on the module producing the protected stream and an adequate rearrangement table is present on the decryption module. Another variant is to construct, starting from the protection table, a rearrangement table that is then sent to the decryption module at the same time as the scrambled data. A third variant consists ~~in that~~of the decryption module that produces the rearrangement table from information of the arrangement table sent by the encryption system.

However, ~~the~~that process applies solely to MPEG streams containing natural video and does not refer to streams of the MPEG-4 type. The variant of ~~this~~that invention which permutes slices is not applicable to streams of the MPEG-4 type because the slice structure does not exist in streams of the MPEG type. Moreover, no mention is made concerning the protection of movement vectors.

~~This~~That invention does not completely address the security problems but rather proposes a classic scrambling solution bringing about ~~the~~a permutation of elements constituting the video stream~~, but~~. However, the protective stream contains all the elements constituting it, which is integrally sent to the user. ~~If~~The stream can be descrambled if an ill-disposed person takes possession of the arrangement tables or rearrangement tables ~~the stream can be descrambled~~. Moreover, the protected data and the arrangement tables or the rearrangement tables are sent by the same path as the initial protected stream and, in a variant, the protected data and the information for the rearrangement tables are sent by the same path and at the same time.

Summary of the Invention

This invention relates to a process for distributing video sequences according to a nominal stream format that describes a plurality of audiovisual scenes, each scene formed from a plurality of hierarchical audiovisual objects and a describer of the hierarchy and spatial and temporal relationships between the objects, with each video object including at least one digital plane P, including analyzing the nominal stream to generate a first modified stream having a format of the nominal stream and having planes P, B or S (GMC) containing macroblocks of which all or part of values of movement vectors were modified, generating a second stream with any format including digital information to permit reconstruction of the modified planes, separately transmitting the two streams from the server to addressed equipment, and calculating a synthesis of a stream to the nominal format on the addressed equipment as a function of the first and second streams.

Brief Description of the Drawings

This invention will be better understood upon reading the following description of a non-limiting embodiment with reference made to the attached drawings.

Fig. 1 describes the total architecture of a system for carrying out the process in accordance with the invention.

Fig. 2 represents a particular embodiment of the system for analyzing and synthesizing the stream in conformity with the invention.

Fig. 3 represents a particular embodiment of the system for synthesizing the stream in conformity with the invention.

Detailed Description

~~In order to correct these various faults the invention relates to~~It would therefore be advantageous to provide a process for ~~the distribution of~~distributing video sequences according to a

nominal stream format constituted ~~by~~of data representing a succession of audiovisual scenes constituted ~~by~~of audiovisual objects forming a hierarchy according to a script describing their relations in space and in time, each of which comprises at least one P plane as is the case with the MPEG-4 norm.

As is well known ~~to the expert~~ in the art, the MPEG-4 norm introduces the notion of video object (VO for "video object"), e.g., a person or a passing car. ~~In the simplest case the~~The VO is a rectangular object in the simplest case. The MPEG-4 norm also introduces the video object layer (VOL). ~~This~~The latter is composed ~~by~~of groups of video object planes (GOV) that contain several video object planes (VOP) that represent a video object at a given moment. This breakdown into object greatly facilitates ~~the~~ interactivity and it becomes easier to obtain information about an object (the player or the passing car).

The basic principle of MPEG-4 compression is based on the content. It is thus necessary to separate the background from the animated objects. One of the characteristics of MPEG-4 is to separate well the objects and the background of a scene ~~in order~~ to then obtain advantages from this for ~~the~~ compression and ~~the~~ supplementary functionalities which this entrains. This permits, e.g., during a pan, the complete background to be transmitted only once and the animated objects to be sent separately.

Please replace paragraphs [0024] through [0027] with the following:

Moreover, ~~in order to increase the possibilities of manipulation,~~ hierarchies of VOP's associated with different degrees of accessibility are also taken in account to increase the possibilities of manipulation.

~~All this~~This permits the user to be able to interact with the objects of the scene. A few ~~possible~~representative manipulations follow:

Modification of the spatial position of an object (VOP) in the scene,

Application of a spatial factor of scale to an object in the scene,

Change of the speed with which an object moves in the scene,

Addition of objects, and

Elimination of an object from the scene.

In the MPEG-4 norm the information about the shape, movement and texture of the VOP's are coded and the VOL (video object layer) layers separated ~~in order~~ to permit ~~the~~ separate decoding of the VOP's. With MPEG-4 the rectangular image is only a particular case of coding multiple VOP's as an image with an arbitrary shape.

The MPEG-4 VM (MPEG-4 video verification model) makes use of an identical algorithm ~~in order~~ to code information about the shape, movement and texture in each layer. However, the information about the shape is not transmitted if the sequence to be coded contains only standard images with a rectangular form. In this instance the video coding algorithm MPEG-4 has a structure similar to the MPEG-1 and MPEG-2 algorithms. This is suitable for applications that require great coding efficiency without requiring extensive functionalities based on the content.

Please replace paragraphs [0030] through [0043] with the following:

In general, the input images that are to be coded for each VOP layer are of an arbitrary shape and the position and ~~the~~ shape of the images vary in time with respect to a reference window. In such a case MPEG-4 VM introduces the concept of VOP reference window with a macroblock format adaptable to the form. All the VOL layers that are to be coded for an input video sequence are defined relative to the reference window, whose form is constant.

The information in the form of a VOP is coded before ~~the~~ coding ~~of~~ the position vectors based on the macroblock format of the VOP and can be used as well for ~~the~~ encoding as for the

decoding. In the following ~~stages~~steps of the process only the information concerning the movement and ~~the~~ texture of the blocks of the macroblock are coded (which comprises the standard macroblocks and the contour macroblocks).

In its most general sense, the invention relates to a process for ~~the distribution of~~distributing video sequences according to a nominal stream format intended to describe a plurality of audiovisual scenes, each scene being constituted ~~by~~of a plurality of hierarchical audiovisual objects and by a describer of this hierarchy and spatial and temporal relationships between these objects with each video object comprising at least one digital plane P, characterized in that an analysis of the stream is carried out before the transmission to the client equipment ~~in order~~ to generate a first modified stream ~~presenting~~having the format of a nominal stream, and a second stream with any format, comprising digital information suitable for permitting ~~the~~ reconstruction of these modified planes, that the two streams generated in this manner are then transmitted separately from the server to the addressed equipment and ~~that~~ a synthesis of a stream to the nominal format is calculated on the addressed equipment as a function of ~~this~~the first stream and of ~~this~~the second stream.

This synthesis advantageously produces a stream that is rigorously identical to the original stream, that is to say, that the process is without loss.

In a particular ~~embodiment of this process~~aspect, each video object comprises at least one plane N and the data representing this plane is calculated as a function of the differences between this plane N and at least one other plane. This first stream advantageously ~~presents~~has modified planes N.

According to ~~an embodiment~~one aspect of this process the data of at least one plane N is calculated by a compensation of the movement of ~~this~~ plane N relative to the preceding plane N. Plane N is then called plane P (predicted).

According to another ~~embodiment of this process~~aspect, the data of at least one plane N is calculated by compensation of the movement of ~~this~~ plane N relative to preceding and following planes N or P. Plane N is then called plane B (bidirectional).

The format of the nominal stream is advantageously defined by the norm MPEG-4. In ~~an embodiment of this process this~~one aspect, the first stream ~~presents~~has modified planes P. In another ~~embodiment of this process this~~aspect, the first stream ~~presents~~has modified planes B.

For ~~an expert~~one skilled in the art, video streams of the MPEG-4 type break down in the form of a succession of plane I, P, B or S. Planes I are called Intra. These are reference planes, with an increased size, and do not contain information related to the movement. Planes P are called predicted. They ~~are related~~relate to the planes preceding them (planes I and/or P) by movement vectors in a single direction called forward. Planes B are called directional. The are connected to planes I and/or P preceding them and following them by movement vectors in the two directions (forward and backward).

Moreover, one of the characteristics of the MPEG-4 norm ~~consists in~~is breaking down a video scene into different video objects. The background can then be non-correlated with the other video objects and encoded in the plane form called Sprite (S-VOP). These planes can be static or mobile. ~~In the latter instance one~~One speaks of plane S-GMC for global motion compensation in the latter instance. These mobile planes also contain information connected to the movement.

The base unit for detecting ~~the~~ movement in a plane is the macroblock, which generally corresponds to a block of 16x16 pixels of the image (in specific instances the size can be different but this causes no problem for the invention). Each macroblock necessarily contains one type from the five different possible types: "Inter", "Inter+Q", "Inter4v", "Intra" or "Intra+Q". Each macroblock also contains other data necessary for decoding the information that follows. This data is

differential movement vectors and blocks of luminance and of chrominance (4 blocks Y, 1 block Cb and 1 block Cr) each of which contains the differential coefficients DC and AC if they exist. They are used for reconstructing the coefficients DC and AC of the current block. The coefficient DC represents the continuous component issued from the transformation into discrete cosine of the values of the pixels of the bloc. The AC coefficients represent one or several non-zero horizontal and/or vertical spatial frequencies.

Please replace paragraph [0045] with the following:

Each of these values is decoded as a function of the movement type of the plane to which it belongs. This concerns forward, backward and direct. ~~In each instance the~~The differential movement vector is described by two values (in pixels) in each instance. The first corresponds to the horizontal shifting and the second to the vertical shifting.

Please replace paragraph [0048] with the following:

~~In the case of binary alpha blocks that are present in the video stream whose form is not rectangular, differential~~Differential vector movements can also be decoded in the case of binary alpha blocks that are present in the video stream whose form is not rectangular. There is only one differential vector movement in each BAB. The BAB or binary alpha blocks are groups of 16x16 pixels issued from ~~the~~ cropping ~~of~~ the limitation rectangle put in place for the shape coding for the video object. The horizontal and vertical values are coded in VLC and the authorized values are normalized.

Please replace paragraphs [0050] through [0063] with the following:

Examples ~~of embodiments~~

Transforming these values while respecting the authorized VLC codes allows the rendering of a video stream to be very heavily corrupted. The visual effects are multiple: Separation or super-

positioning of objects, flickering of the image, liquefaction effect or pixelation effect, inversion of movement, all of which renders ~~the~~ viewing ~~of~~ the stream very painful to the human eye. This analysis advantageously decides the differential vector movements to be modified as a function of the desired size for the second stream and of the desired degradation for this first modified stream~~; these~~. These modifications can be: ~~Replace~~replace the differential vector movements of a plane P by differential vector movements of another plane P, invert two differential vector movements of the same plane P, invert two differential vector movements of two planes P of the same stream, replace the differential vector movements of a plane P by random values, invert the value of one or several bits well selected from the value of the differential vector movements of a plane P.

According to a particular ~~embodiment~~aspect of this process at least one plane B is modified in the same manner as planes P. This analysis advantageously decides the planes P, B and S to be modified as a function of the desired size for this second stream and ~~of~~ the desired level of degradation for this first modified stream.

In a particular ~~embodiment~~aspect of this process the transmission of this first stream is realized via a physically distributed support material such as a CD-ROM, a DVD, a hard disk or a memory card of the flash memory type for example.

In another ~~embodiment~~aspect of this process the transmission of ~~this~~the first stream is realized via a broadband network (cable, satellite, optical fiber, microwave, DSL, DAB).

According to the implementation of this process the transmission of ~~said~~the second stream is realized via a cable network, a switched telephone network (analog or digital RTC), a mobile telephone network using the GSM, GPRS or UMTS norms, a BLR network (local radio loop) or via a network of the DSL type. According to a particular ~~variant~~aspect of this process the transmission

of ~~this~~the second stream is realized via a broadband network of the same type as the network used by the first stream, even via the same network.

According to a particular ~~variant~~aspect of this process the transmission of ~~this~~the second stream is realized by a memory card of the flash memory type or by a smart card. The transmission of one of the two streams or of the two streams is advantageously encrypted.

According to the implementation of this process the two generated streams can be addressed to a single piece of equipment, to a group of equipment or to all the equipment. According to a particular ~~embodiment~~aspect the reconstruction is conditioned by a transaction. The reconstruction can also be authorized for a consultation of a private copy requested by the client. In a general manner, the fact that the reconstruction is conditioned by the portal allows every operator of the service to manage all the rights attached to the audiovisual works.

Furthermore, the invention relates to a piece of equipment for producing a video stream for carrying out this process comprising at least one multimedia server containing the original video sequences and ~~characterized in that it comprises~~comprising a device for analyzing the video stream coming from the server ~~in order~~ to generate the two streams.

Please replace paragraphs [0065] through [0088] with the following:

Moreover, the invention relates to a piece of equipment for using a video stream ~~for carrying~~to carry out this process comprising a standard stream decoder, at least one recording interface (hard disk, memory of the flash memory type) intended to store the content of ~~said~~the first stream and/or a disk player (CD, DVD, etc.),and at least one display interface (standard screen, wireless screen, video projector), ~~characterized in that it comprises~~comprising means for the recomposition of the original stream from the two streams.

According to a particular ~~embodiment this~~aspect, the this means is a software application installed on the equipment. According to another ~~embodiment this~~aspect, the means is a fixed electronic device. According to another ~~embodiment this~~aspect, the means is a portable (mobile) electronic device with its incorporated screen.

According to an ~~embodiment~~aspect in which the equipment is installed on a computer, ~~this~~the means uses a resource specific to the product (card) ~~in order~~ to avoid ~~the~~ copying ~~of~~ the temporary information of the second stream onto a permanent support.

~~This~~The recording interface advantageously also stores a marker "private copy" related to ~~said~~the first stream indicating for this sequence the rights of the user: ~~Private~~private copy can be viewed an unlimited number of times, private copy can be viewed a limited number of times and what number, private copy forbidden.

The equipment advantageously comprises a smart card reader (permitting the identification of the user, or a smart card reader containing the software applications or a smart card reader containing the data of the second stream for a given content.

~~The equipment advantageously comprises a smart card reader containing the software applications.~~

~~The equipment advantageously comprises a smart card reader containing the data of said second stream for a given content.~~

Finally, the invention relates to a system for transmitting a video stream, ~~characterized in that it comprises~~comprising equipment for producing a video stream, at least one piece of equipment for using a video stream, and at least one communication network between the production equipment and the piece(s) of equipment for use.

~~The present invention will be better understood upon reading the following description of a non-limiting embodiment with reference made to the attached drawings.~~

~~Figure 1 describes the total architecture of a system for carrying out the process in accordance with the invention.~~

~~Figure 2 represents a particular embodiment of the system for analyzing and synthesizing the stream in conformity with the invention.~~

~~Figure 3 represents a particular embodiment of the system for synthesizing the stream in conformity with the invention.~~

The invention relates to a stream of data with a nominal format, especially but not exclusively, a stream of the MPEG-4 type. The format of the audiovisual stream used ~~must have~~has the following characteristics:

~~This~~the format ~~must~~ breaks the data down into frames and each frame comprises a complete plane I and at least one plane P calculated while coding the differences (compensation of movement) between this plane ~~[sic—frame?]~~ and the preceding plane I or P[[.]],

~~Each~~each frame optionally comprises at least one plane B calculated while coding the differences (compensation of movement) between this plane ~~[sic—frame?]~~ and the preceding and following planes I and/or P.

The invention relates to a stream of data with a nominal format, especially but not exclusively, a stream of the MPEG-4 type. The format of the audiovisual stream used ~~must have~~has the following characteristics:

~~This~~the format ~~must~~ breaks the data down into frames and each frame comprises at least one plane P[[.]],

~~Each~~each plane P contains differential movement vectors between the different blocks and/or macroblocks of planes P.

In the following description, the example relates to an MPEG-4 stream without this constituting a limitation of the scope of protection.

The general principle of a process for securing a video stream is ~~revealed in the following~~described as follows. The objective is to authorize ~~the~~ on-demand and à-la-carte video services via all these broadcasting and local recording networks in the digital set-top decoder box of the user. The solution ~~consists in~~includes permanently retaining a part of the audiovisual recorded program outside of the user's dwelling, in fact, in the broadcasting and transmitting network, which part is of primary importance for visualizing this audiovisual program on a TV or monitor screen but which has a very low volume in comparison to the total volume of the digital audiovisual program recorded at the user's dwelling. The lacking part will be transmitted via the broadcasting/transmitting network at the moment of viewing of this prerecorded digital audiovisual program at the user's dwelling.

The greatest part of the audiovisual stream ~~will~~is therefore ~~be~~ transmitted via a classic broadcasting network whereas the lacking part will be sent on demand via a narrow telecommunication band such [[a]] the classic telephone ~~networks~~ or cellular networks of the GSM, GPRS or UMTS type or using a small part of a network of the DSL or BLR type or also using a subset of the bandwidth divided on a cable network.

~~In the attached drawings:~~

~~Figure 1 shows a basic scheme of a distribution system in accordance with the present invention.~~

~~Figure 2 shows a particular embodiment of the system for stream analysis and synthesis in accordance with the invention.~~

~~Figure 3 shows a particular embodiment of a system for stream synthesis in accordance with the invention.~~

~~In figure~~Turning now to the drawings, in Fig. 1, the arrangement for video interfacing 8 is adapted to connect at least one display device, e.g., a monitor, a video projector or a device of the TV screen type 6 to at least one interface of a broadband transmission and broadcasting network 4 and to at least one telecommunication network interface 10. ~~According to the present invention this~~This arrangement is composed of module 8 mainly comprising on the one hand a processing unit adapted to process in particular decoding and descrambling all video streams of the MPEG-4 type according to a preloaded decoding and descrambling software program in such a manner as to display them in real or non-real time, store them, record and/or send them on a telecommunication network and, comprising on the other hand, at least one screen interface 7 and a connection interface to a local or wide area network 5 and/or 9. Broadband transmission and broadcasting network 4 and telecommunication network 10 can be combined into a single network.

The hard disk of module 8 can be used as a buffer memory to instantaneously store at least a part of the program or of the video stream to be displayed in the case of time shift viewing or of limitation in the bandwidth of the transmission network. The viewing can be delayed or time-shifted upon the request of the user or of the portal 12.

As ~~figure~~Figs. 1 shows, connection interface 5 is connected to a broadband transmission and broadcasting network 4 such as a modem, satellite modem, cable modem, fiber-optic line interface or to a radio or infrared interface for wireless communication.

The content of audiovisual programs such as films will be transmitted by this classic video broadcasting connection. Nevertheless, ~~in order to not allow pirated copies to be made,~~ a small part of the audiovisual content is retained in portal 12 before the audiovisual content is transmitted from server 1 or portal 12to not allow pirated copies to be made.

Please replace paragraphs [0090] through [0098] with the following:

Since the successive planes of a video sequence comprise a large number of identical visual elements (as in a movie, one image resembles the preceding one), MPEG-4 only registers the elements that differ from the original plane. Thus, an entire reference plane ~~will~~can be modified while retaining the modifications made to the differential movement detectors in portal 12, and it is not necessary for the successive planes depending on this reference plane I to add modifications since they would make the viewed stream diverge on account of disturbances added to planes P.

The MPEG-4 compression therefore begins at first by breaking down the image into different square matrices comprising several points or pixels, each one of which has its own colorimetric value. A calculation permits the obtention of an average value for each matrix in which each point is now embedded. This processing generates a pixelation and the appearance of solid colors where nuances of shade existed. The second stage of the MPEG-4 compression consists ~~in~~of retaining only the changing elements from one plane to the other.

~~In order to~~To obtain animated images of the MPEG-4 type, the principle ~~consists in capturing~~is to capture several images in time and the intermediate images are calculated from the latter. ~~The analysis~~Analysis of the complete reference planes permits ~~the~~ prediction of intermediate planes P. Then, planes B are intercalated between reference planes and predicted planes.

The video is represented as a succession of individual planes, each of which is processed as a two-dimensional matrix of image elements (pixels). The representation of the colors of each pixel

comprises three components~~; A~~---a luminance component Y and two chrominance components Cb and Cr.

~~The compression~~Compression of the digital video is ~~realized~~achieved by using several techniques: Sampling of chrominance information for adaptation to the sensitivity of the human visual system (HVS), quantification, movement compensation (MC) for utilizing time-dependent redundancy, transformation into the frequency range by discrete cosine transformation (DCT) for utilizing the spatial redundancy, variable length coding (VLC) and interpolation of images.

Since the human visual system is most sensitive to the resolution of the luminance component of an image, the values of pixel Y are coded in full resolution. The human visual system is less sensitive to chrominance information. ~~The sub~~Sub-sampling eliminates the values of pixels based systematically on the position, which reduces the quantity of information to be compressed by other techniques. The standard retains a unit of chrominance pixels for each vicinity 2x2 of luminance pixels.

The base coding unit of an image is the macroblock. The macroblocks of each image are coded successively from left to right and from top to bottom. Each macroblock is composed of 6 8x8 blocks; four luminance blocks, one chrominance block Cb and one chrominance block Cr. ~~Note that the~~The four luminance blocks cover the same zone of the image as each of the chrominance blocks due to ~~the~~ sub-sampling of ~~the~~ chrominance information carried out ~~in order~~ to adapt ~~the~~ coding to the sensitivity of the human visual system.

For a given macroblock the first operation is ~~the~~ selection of the coding mode, which depends on the type of image, the effectiveness of the compensated movement prediction in the coded region and ~~on~~ the nature of the signal contained in the block. Secondly, a compensated movement prediction of the block content based on prior or future reference images is formed. This prediction is

subtracted from the real data of the current macroblock ~~in order~~ to form an error signal. Thirdly, this error signal is divided into 6 8x8 blocks (4 luminance blocks and 2 chrominance blocks in each macroblock) to each of which a discrete cosine transformation is applied. The resulting 8x8 block of DCT coefficients is quantified. The two-dimensional block that results is scanned in zigzag ~~in order~~ to be converted into a one-dimensional chain of quantified DCT coefficients. Fourthly, the attached information of the macroblock (type, vectors, etc) as well as the data of the quantified coefficients is coded. ~~In order to obtain maximum effectiveness, a~~A certain number of coding tables with variable length are defined for the various data elements to obtain maximum effectiveness. A coding of the run lengths is applied to the data of the quantified coefficients.

The coefficient DCT of upper left point 0,0 of the block represents a zero horizontal and vertical frequency: It is called coefficient DC (continuous). As ~~the~~ coefficient DC is proportional to the average value of the pixels of block 8x8, ~~the~~ predictive coding permits a supplementary compression because the difference of the average values of the adjacent 8x8 blocks tends to be relatively small. The other coefficients represent one or several spatial horizontal and/or vertical frequencies that are not zero and are called AC coefficients. ~~In order that the quantification level of the coefficients corresponding to the elevated spatial frequencies favors the creation of a zero coefficient, a~~A quantification step such as the human visual system (VHS) is selected that has little chance of perceiving the loss of the spatial frequency concerned unless the value of the coefficient is above this quantification level such that the quantification level of the coefficients corresponding to the elevated spatial frequencies favors the creation of a zero coefficient. The statistical coding of the provided consecutive ranges of coefficients with an elevated order and zero value contributes considerably to the gain of compression. ~~In order to~~To regroup the non-zero coefficients at the beginning of the series and ~~to~~ code as many zero coefficients as possible following the last non-zero

coefficient, ~~their~~the sequences given by a zigzag scanning that concentrates the elevated spatial frequencies at the end of the series.

Please replace paragraphs [0100] through [0105] with the following:

The invention ~~consists in using~~uses and ~~modifying~~modifies the differential movement vectors of planes P and/or B and/or S ~~in order~~ to be able to manipulate the aspect and the visual validity of the sequence to which the planes in question belong.

According to a particular ~~embodiment~~aspect, the complete MPEG-4 stream is analyzed by analyzing device 121 of portal 12~~; all~~. All the planes P are analyzed ~~in order~~ to find each of their differential movement vectors. For each value found the system proceeds to back it up in buffer 123 of portal 12 and it is replaced in the stream by the maximal value authorized by the norm, identically for each value found. The transformed stream is stored in output buffer 122. Its size is different from original stream 101 but it is perfectly readable by any user 8 capable of reading original stream 101.

According to a particular ~~embodiment~~aspect, all planes P of complete MPEG-4 stream 101 are analyzed by analysis device 121 of portal 12 ~~in order~~ to find each of their differential movement vectors. ~~In order to reduce the size of the backed-up data only~~Only the differential movement vectors of one macroblock of every two or three ~~will be~~is transformed to reduce the size of the backed-up data. The means for finding the planes which were modified ~~will be~~are retained in buffer 12 of portal 12 with the original values of the transformed differential movement vectors.

According to a particular ~~embodiment~~aspect, all planes P of complete MPEG-4 stream 101 are analyzed by analysis device 121 of portal 12 ~~in order~~ to find each of their differential movement vectors. ~~In order to~~To have a transformed stream with a size identical to original MPEG-4 stream 101 at the level of output buffer 122 only a certain number of bits are transformed into the VLC code representing the processed value so that the resulting VLC code respects the norm and that the new

value is sufficiently removed from the original one ~~in order~~such that the transformation is the most efficient one possible.

According to a particular ~~embodiment~~aspect, only one part of the planes of the original MPEG-4 stream 101 ~~will be~~is analyzed and transformed, thus permitting a reduction of the size of the data memorized in buffer 123 of portal 12.

~~When it reads the binary stream a~~A classic MPEG-4 decoder identifies the beginning of a coded plane when it reads the binary stream, then the type of the plane. ~~In order to~~To avoid any confusion between a standard decoder box, often called a set-top box or STB, the standard MPEG-4 decoder is called "reader" (player or viewer) in the remainder of this document. This reader can be realized in hardware and/or in software. The MPEG-4 successively decodes each macroblock of the plane. The plane is reconstructed when all its macroblocks have been processed. If it is a matter of a plane I it constitutes a reference plane for the subsequent planes and it is stored in the place of the oldest reference plane. Thus, the planes are available in digital form for post-processing and display as the application desires.

Please replace paragraphs [0109] through [0127] with the following:

As ~~figure~~Fig. 1 shows, connection interface 9 is connected to wide-area telecommunication network 10 directly or by a local network functioning as access network and is constituted, e.g., ~~by~~of a subscriber line interface (analog or digital telephone network, DSL, BLR, GSM, GPRS, UMTS, etc).

Thus, the audiovisual programs are broadcast in a classic manner in a broadcasting mode via broadband transmission network 4 of the microwave, cable, satellite, digital microwave, DSL, etc. type from server 1 directly via connection 3bis or portal 12 via connections 2, 3 to set-top box 8 via connection 5. Each audiovisual program broadcast in this manner can be encrypted or not encrypted

and~~, in conformity with the present invention,~~ the streams of the MPEG-4 type comprise modifications at the level of certain planes P and or B as described above. Certain audiovisual programs modified in this manner and incomplete are recorded on the hard disk of box 8 as a function of the parameters selected by the user or of information transmitted by the broadcasting server.

When the user desires to view an audiovisual program recorded in this manner onto the hard disk of ~~his~~ box 8, ~~he~~the user makes the request for this in a classic manner by a remote control connected to ~~his~~ box 8 that is then automatically connected to portal 12 via connection 9 of the local network or direct access type and the telecommunication network 10 connected itself to portal 12 via connection 11. Connections 9, 11 remain established during ~~the~~ viewing of the audiovisual program and permit box 8 to receive the functions and parameters of recovery in the order of the modified differential movement vectors of planes P. The modified differential movement vectors of planes P transmitted in this manner are ~~never~~not recorded on the hard disk of box 8 because reconstituted planes P are directly displayed on viewing screen 6 via connection 7 after having been processed by the reader of box 8 from its local volatile memory. Once processed and viewed, the modified and/or lacking differential movement vectors of planes P that were transmitted by portal 12 ~~will be~~are deleted from the local volatile memory of box 8.

~~According to a particular embodiment the~~The original values of the differential movement vectors of planes P broadcast in this manner ~~can~~may be encrypted or not encrypted by any existing or future encryption means. The same applies to the algorithms, the functions and parameters of recovery in the order of the modified differential movement vectors of planes P.

Each time that the user desires to view a program recorded in the hard disk of box 8, box 8 is automatically connected to portal 12. Likewise, when the user makes a pause, the transmission of the modified differential movement vectors of plane P coming from portal 12 ~~will be~~is interrupted

until ~~the~~ viewing is resumed, thus guaranteeing that all the information of an audiovisual program is not located in box 8 at a given moment, thus preventing an ill-disposed person from making pirated copies of these recordings.

~~According to a particular embodiment box~~Box 8 may comprise[[s]] a smart card reader that allows portal 12 to authenticate the user who owns box 8. ~~According to a particular embodiment~~ ~~the~~The smart card may contain[[s]], for a given MPEG-4 content, ~~said~~the second stream that was memorized by portal 12.

If this has been authorized, the smart card also allows the user to make private copies of the audiovisual programs recorded on the hard disk of ~~his~~ set-top box 8. For this, if the user desires to make a private copy of an audiovisual program ~~he will do~~the user does so in a classic manner on a video cassette recorder via connection 7 which connects box 8 to viewing screen 6.

However, if ~~he~~the user wishes to retain a private copy on the hard disk of ~~his~~ box 8, ~~he will~~the user indicates this to ~~his~~ box 8, that will record the information "private copy" as well as the address of the user located on the smart card in a particular field 84 of this audiovisual program recorded on hard disk 85 of set-top box 8. Then, each time that the user wants to see this private copy, box 8 connects automatically to portal 12 and indicates to the latter that the user wants to read ~~his~~the private copy. In return, if ~~the~~ reading ~~of~~ the private copy is possible for this user who possesses this smart cart connected to this box 8, set-top box 8 then receives the modified and/or lacking differential movement vectors of planes P as well as all the other information allowing ~~the~~ viewing of the audiovisual program constituting the private copy.

According to another ~~embodiment~~aspect, if the user wants to retain a private copy on the hard disk of ~~his~~the box, ~~he~~the user indicates this to the server that will record the information 'private copy" for this program in the private copy memory 124 of portal 12 and for this user authenticated by

the smart card. Then, every time that the user wants to see this private copy, box 8 connects automatically to portal 12 and indicates to it that the user wants to read ~~his~~the private copy. In return, if ~~the~~ reading ~~of~~ the private copy is possible for this user who possesses this smart cart and for this program, set-top box 8 then receives the lacking modified differential movement vectors of planes P as well as all the other information allowing the viewing of the audiovisual program constituting the private copy.

~~According to a particular embodiment the~~The private copy can allow the user to view this very audiovisual program in an unlimited manner or a number of times determined in advance by the supplier of the service that authorized this private copy.

The ~~present~~ invention also relates to the physical box 8 used by the consumer for accessing the data. ~~This~~The physical box is situated in the home of the user. It supplies a number of functions that manage the information appropriate for presentation in accordance with the selection of the audience and manages the connection and ~~the~~ communication with the remote server.

~~According to a particular embodiment the~~The physical box corresponding to video interface arrangement 8 ~~is~~may be realized as an autonomous fixed device with an integrated hard disk. ~~According to a particular embodiment the~~The physical box corresponding to video interface arrangement 8 ~~is~~may also be realized as an autonomous portable (mobile) device with an integrated hard disk and/or disk reader (CD, DVD, etc.).

~~According to a particular embodiment video~~Video interface arrangement 8 is realized as an additional part to be installed in a computer of the PC type and ~~to~~may be connected to at least one broadband transmission and broadcasting network interface 4 and to at least one telecommunication network interface 10. This card makes use of the hard disk of the PC computer ~~in order~~ to record the first stream but comprises its own computer and its own volatile memory in such a manner as not to

allow an ill-disposed user of the PC the means to access complementary information such as the modified differential movement vectors of planes P of the second stream.

~~According to the present invention the~~The video and multimedia servers 1 and/or 12 comprise means for coding, transcoding and scrambling video data, in particular means for adding cryptographic and security information at the beginning of and during the sequences.

Finally, ~~it remains to be pointed out that~~ the invention degrades the MPEG-4 stream from the visual viewpoint until it no longer allows ~~the recognizing~~recognition of the ~~scenes~~ transmitted and displayed scenes without having access to the complementary data and characteristics but rather totally reconstitutes the MPEG-4 stream in video interface arrangement 8 without any loss.

Although the ~~present~~ invention is more particularly focused on audiovisual data, it is understood that all interactive multimedia information and all interactive data can be processed by the ~~present~~ arrangement and the ~~present~~ system and that the video data of the MPEG-4 type has been worked out the most.

The ~~present~~ invention will be better understood from the following description presenting the physical base of the ~~present~~ invention and making reference to ~~figure~~Fig. 2 ~~of the attached drawings~~ representing a preferred ~~embodiment~~aspect of the invention by way of non-limiting realization that is particularly well-adapted for cable and satellite networks. The complete MPEG-4 stream is analyzed by analyzing device 121 of portal 12 and ~~will~~is thus ~~be~~ separated in a stream of the MPEG-4 type but whose one part or all the differential movement vectors of planes P ~~will have~~has been processed and ~~that will be~~ sent via output 122 of the portal to broadband broadcasting transmission network 4.

Please replace paragraph [0129] with the following:

In the examples ~~realized~~ the differential movement vectors of certain planes P of MPEG-4 stream are modified for a first user~~; for~~. For a second user, certain differential movement vectors of

planes P and of certain planes B of the MPEG-4 stream are modified ~~and in the~~. In a third example, device 8 is portable (mobile).

Please replace paragraphs [0131] through [0132] with the following:

Portal 121 has selected MPEG-4 stream 101 that it must send to user 8 for being viewed off-line on ~~his~~ TV screen 6. This user is connected to a digital broadcasting cable network 4 and to an ADSL telecommunication network 10.

Analysis system 121 of portal 12 ~~will~~ thus reads MPEG-4 entering stream 101 and every time that it detects a plane P it ~~will~~ breaks it down into macroblocks, then into blocks. This analysis allows it to recognize the differential movement vectors in the code and ~~to~~ substitute certain ones of them by random values ~~in order~~ to make the planes (and consequently the sequence) illegible for human viewing. The true values of the differential movement vectors ~~will be~~ are stored in output buffer 123, that allows ~~the~~ reconstitution of the starting sequence in box 8 at a later time following the inverse scheme. In the realized example one macroblock of every two comprises a modified block (differential movement vectors).

Please replace paragraph [0134] with the following:

The new modified MPEG-4 stream is then recorded in output buffer 122 ~~in order~~ to be broadcast on broadcasting network 4 via connection 5. The substituted differential movement vectors of modified planes P of entering MPEG-4 stream 101 are memorized in buffer 123 of portal 12.

Please replace paragraphs [0136] through [0140] with the following:

Each authorized set-top box 8 that wishes to record this MPEG-4 stream modified in this manner can then read this MPEG-4 stream and record it on its hard disk 85. This recording initiative is left to decoder 8 under the control of portal 12. To this end, analysis system 121 had entered

information about supplementary data at the beginning of the MPEG-4 stream that clarified the addressees of this modified MPEG-4 stream. The addressees can thus be a particular addressee 8 ~~by himself~~alone, a group of addressees 8 or the totality of decoders 8 connected to network 4.

The phase described above corresponds to the first preparation phase of the MPEG-4 stream by portal 12, ~~to~~ its transmission via broadband network 4 and ~~to~~ its recording in decoder 8. ~~This~~The decoder can then display ~~this~~the MPEG-4 stream recorded on its hard disk 85. To this end synthesizing system 87 of decoder 8 ~~will~~ reads the MPEG-4 file from its hard disk 85 and sends it to a classic MPEG-4 reader 81. If no complementary data is received by synthesis system 87 the MPEG-4 stream coming to reader 81 is then processed and displayed as it is , which brings about a significant distortion of the display on viewing screen 6. In fact, modified planes P processed by synthesis system 87 do not correspond to planes P that are necessary for a correct viewing since certain differential movement vectors have been substituted by random differential movement vectors. On the other hand, as the recorded stream is a stream of the MPEG-4 type, reader 81 does nothing different and displays the information of output screen 6 that appear as data of an MPEG-4 video stream but totally incoherent to a human looking at screen 6. Every copy of MPEG-4 stream coming from hard disk 85 of box 8 ~~will~~ produces the same visual effect during its restitution by any MPEG-4 reader. Thus any ill-intentioned ~~using~~use of this copy will fail.

When the user of box 8 desires to view the audiovisual program recorded on ~~his~~ hard disk 85 in real time on his screen 6, ~~he~~the user requests this from synthesis system 87 with ~~his~~a remote control as ~~he~~the user would do with a VCR or a DVD player that ~~presents~~has a menu on ~~his~~the TV screen. Synthesis system 87 then makes a request to hard disk 85 and begins to analyze the modified MPEG-4 stream coming from hard disk 85 via reading buffer 83. Synthesis system 87 then establishes a connection with portal 12 via telecommunication network 10 that is, in our example, a

DSL connection. Once this connection is established and during the entire duration of the viewing of the film or audiovisual program, synthesis system 87 retrieves the substituted differential movement vectors and the data corresponding to modified plane P of the stream recorded on hard disk 85 from buffer memory 123 of server 12. These differential movement vectors and this positional data come to synthesis system 87 via input buffer memory 86 and are temporarily stored in volatile memory 88 of synthesis system 87. Synthesis system 87 reconstitutes, in a manner that is inverse to the analysis process previously described, modified planes P by real planes P from the modified MPEG-4 stream arriving via buffer 83 and from the differential movement vectors and the associated data that arrives via buffer 86 into memory 88 and sends the new MPEG-4 stream reconstituted in this manner to reader 81 to be correctly displayed on screen 6. As soon as they have been used, the differential movement vectors to be substituted and the data associated with these planes P are deleted from volatile memory 88.

In the example ~~realized~~, before portal 12 authorizes the sending of planes P and the associated data from its buffer 123, portal 12 has verified that the user of box 8 was properly authorized ~~to do this~~. To this end portal 12 reads the information contained on smart card 82 of box 8 and verifies that this user is properly authorized to view this audiovisual program. The differential movement vectors in the associated data are only sent from buffer 123 to box 8 corresponding to this user via network 10 after this verification.

~~In the example realized, the~~The user also made a private copy of ~~his~~the audiovisual program. Therefore, synthesis system 87 recorded complementary data as well as the number of smart card 82 and the information "private copy" on a part 84 of hard disk 85 as data associated with this audiovisual program. During the next private reading of this audiovisual program synthesis system 87 ~~will~~ analyzes ~~this~~the associated data and thus informs portal 12 that the user of box 8 is reading

the private copy. If this function is authorized for ~~this~~ user 8 by portal 12, the differential movement vectors and the associated data will then be sent by portal 12 to buffer 86 as described above. In the contrary case, the differential movement vectors and the associated data will not be sent and the user of box 8 will not be able to view the reconstituted MPEG-4 stream.

Please replace paragraphs [0142] through [0151] with the following:

In this second instance, broadcasting network 4 is a satellite network and telecommunication network 10 is a low bandwidth cellular telephone system of the GSM type. The user of box 8 ~~will~~ receives the MPEG-4 streams and the complementary data from portal 12 in a manner identical to the above description.

On the other hand, in ~~the~~this example ~~realized~~, instead of modifying each plane P analysis system 121 only takes one plane P our of n where n is a random number between 1 and 12 and takes account of the B's. Thus, before sending the MPEG-4 stream from output buffer 122 analysis system 121 ~~will~~ reads input MPEG-4 stream 101 and after drawing random number n the synthesis system modifies the differential movement vectors at the nth plane P of the MPEG-4 stream. After each plane P modified in this manner, analysis system 121 will make a new drawing of a random number n. Each random number used in this manner is recorded in buffer 123 of portal 12. For planes B analysis system 121 takes into account one plane B out of m where m is a random number between 1 and 5 in a frame for which plane P has not been modified.

Analysis system 121 of portal 12 reads input MPEG-4 stream 101 and each time that it detects an nth plane P or an mth plane B it breaks it down into macroblocks, then into blocks. This analysis allows it to recognize the differential movement vectors in the code and ~~to~~ substitute certain ones with random values ~~in order~~ to render the planes (and consequently the sequence) illegible for human viewing. The true values of the differential movement vectors are stored in output buffer 123

that permits ~~the~~ reconstitution of the starting sequence at a later date in box 8 following the inverse scheme.

Furthermore, in this second ~~realized~~ example all the differential movement vectors of this nth plane P will not be modified. Only one macroblock out of two comprises a modified block (differential movement vectors) while respecting the equality of the modification frequencies for the six blocks of one macroblock. Furthermore, ~~the~~ substitution of each differential movement vector is made by a differential movement vector calculated in a random manner, but its value is compared to the value of the differential movement vector to be substituted in such a manner as to verify its deviation. If this deviation is too small, another random number is calculated in such a manner ~~to~~ as to increase the deviation between the vector to be substituted and the substituting vector. The same applies to planes B.

For ~~the~~ reconstitution of the MPEG-4 stream, box 8 reads buffers 86, 87 and decodes the data elements of the binary stream in conformity with the defined syntax. When it reads the binary stream the box identifies the beginning of a coded plane then the plane type. It successively decodes each macroblock of the plane. The type of macroblock and the movement vectors are used to construct a prediction of the current macroblock based on the prior and future reference planes stored in the box. The data of the differential movement vectors is decoded. The result is added to the prediction signal with defined dynamics. Before sending the MPEG-4 stream to reader 81 synthesis, system 87 replaces the differential movement vectors of planes P and B that were substituted by those of the stream coming from buffer 86.

During ~~the~~ reconstitution of the MPEG-4 stream by synthesis system 87 of box 8, ~~the~~ reading ~~of~~ these random numbers and ~~of~~ the differential movement vectors substituted from output buffer

123 of portal 12 and the reading of the MPEG-4 stream modified in this manner from hard disk 85 of box 8 allows synthesis system 87 to reconstitute planes P and B and ~~to~~ send the entirety to reader 81.

The plane is reconstructed by reader 81 when all these macroblocks have been processed. If a plane P or a plane B is concerned, it constitutes a reference plane for the subsequent planes and ~~it~~ is stored in place of the old reference plane. In the example, ~~realized~~ for this user it was determined that the second stream required a bandwidth lower than one thousandth of the bandwidth necessary for transmitting the high-quality MPEG-4 stream 4 or less than 1 kb per second for the second stream compared to 1 Mb per second for the first MPEG-4 stream.

Please replace paragraphs [0153] through [0158] with the following:

~~In this embodiment the~~The MPEG-4 stream is processed by analysis stream 12 in the same manner as the MPEG-4 stream of the second ~~realization~~example. However, the first modified MPEG-4 stream is entered and recorded on a physical support 20 of the CD type from the output buffer memory of analysis system 12.

The second stream is memorized in buffer 123 and ~~is~~ also recorded in addition on a physical support 10bis with the format of a credit card constituted ~~by~~of a smart card and a flash memory. This card 10bis ~~will be~~is read by card reader 82 of device 8. Device 8 is an autonomous, portable and mobile system. ~~In the realization device~~Device 8 comprises synthesis system 87, standard MPEG-4 reader 81, the two buffer memories 86 and 83 as well as disk reader 85.

Moreover, device 8 comprises integrated screen 6bis of the flat screen type that allows the user to directly view ~~its~~ audiovisual programs on ~~its~~ autonomous device 8.

~~In order to view an audiovisual program of the MPEG-4 type the~~The user of device 8 introduces a disk 20bis of type 20 identical to the one recorded by analysis system 12 into his disk player 85 to view an audiovisual program of the MPEG-4 type. This disk 20bis thus contains an

MPEG-4 stream of the first stream type, that is to say, with the differential movement vectors of certain substituted planes P and/or B.

The user of device 8 can therefore view ~~this~~the MPEG-4 stream on ~~his~~ screen 6bis integrated into ~~his~~the device. However, the MPEG-4 stream will not be correct from the visual viewpoint on account of the substitution of the differential movement vectors. ~~In order to render the stream correct visually, the~~The user introduces memory card 10bis containing the second stream with the differential movement vectors into smart card reader 82 to render the stream correct visually. The synthesis system then reconstitutes the correct MPEG-4 stream from the first stream coming from disk 20bis and from the second stream coming from card 10bis connected to reader 82.